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Reply

Drs. Pelliccia and Corrado as well as Dr. Higgins and colleagues correctly point out that the use of media reports as the sole source of data in our study (1) may have led to an underestimation of the true incidence of arrhythmic death among athletes in Israel. However, the mean annual incidence of sudden death/cardiac arrest events in our study (1) (2.6 events per 100,000 athlete-years) was within the range of event rates reported in Italy (2), the United States (3), and Denmark (4).

Dr. Higgins and colleagues also question why we failed to use the National Center of Forensic Medicine as a source for more complete data and quote a study by Yanai et al. (5) using that methodology in Israel. Regrettably, forensic examinations are performed in only a minority of fatalities in Israel. Nevertheless, 2 points are worth emphasizing: 1) In the study by Yanai et al. (5), more than one-half of the deceased athletes undergoing forensic examination had previously been found "fit to participate in active sports" (again emphasizing the limitations of screening) (5); and 2) in Denmark, where forensic examination is actually mandatory after unexpected death (4), the incidence of sudden death among athletes is strikingly similar to that reported for Italy even though electrocardiographic (ECG) screening is not routinely performed in Denmark, whereas it is mandatory in Italy (2,4).

Countries considering implementation of mandatory ECG screening of athletes should take a close look at the performance of such a strategy in Israel to learn how not to do it. In Israel, no information is collected about the number of athletes undergoing (often unnecessary) additional diagnostic tests or about the number of athletes who have been disqualified since the implementation of the law mandating screening.

Our study is important because it compared pre-screening and post-screening periods of similar duration. This is in contrast to the study by Corrado et al. (2), which showed an impressive reduction in the sudden death rate of athletes in the post-screening period using for comparison a pre-screening period of only 2 years' duration (Fig. 1A). Had we used the same strategy, we would have also erroneously concluded that mass screening of athletes with an electrocardiogram saves lives (Fig. 1B). Only when comparing the post-screening period with a pre-screening period of similar duration (Fig. 1C) one realizes that the apparent "reduction in cardiac-arrest rates," which would otherwise be entirely credited to ECG screening, was made possible by the increase in sudden death rates that preceded the initiation of screening.

Given the important limitations of our study, correctly emphasized by Drs. Pelliccia and Corrado, we do not claim that ECG screening is futile. However, we do maintain that the benefit of ECG screening for the prevention of sudden death in

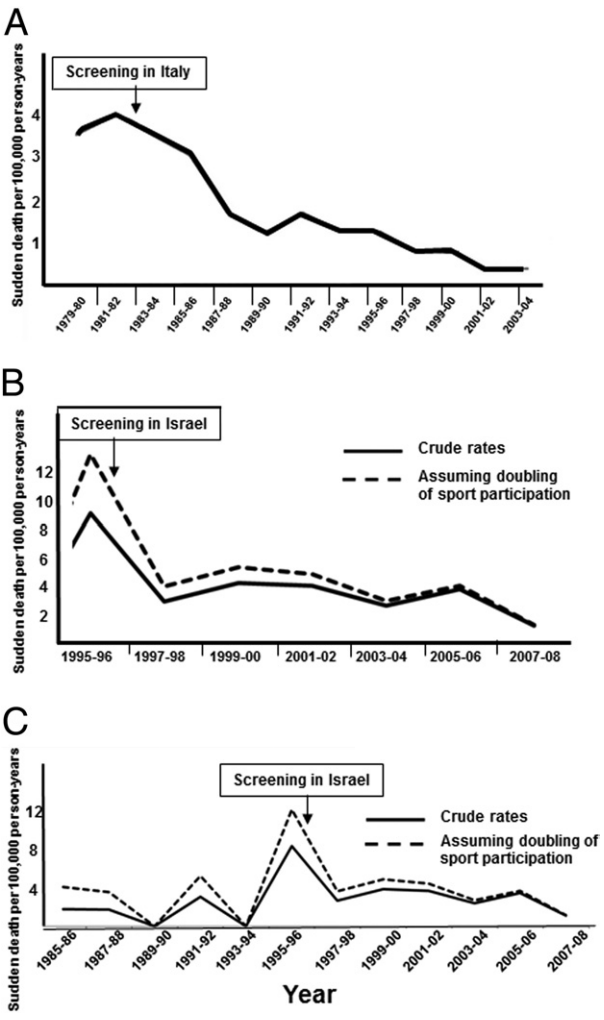

Figure 1 **Annual Incidence of Sudden Death per 100,000 Person-Years Among Competitive Athletes Before and After the Initiation of Mandatory Electrocardiographic Screening**

(A) Results for Veneto, Italy (modified from Corrado et al. [2]). **(B)** Results for Israel. Note how similar the graphs of the 2 studies are when the post-screening period is compared with a 2-year pre-screening period. **(C)** Results for the entire Israeli study (1).

athletes remains unproven. More importantly, even proponents of ECG screening must accept that the level of evidence supporting such strategy has not reached the stage that justifies making this test mandatory. We should not compel athletes to undergo unsolicited tests when all too often we do not know what to do with the results (6).

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